

NITF for ArcGIS User's Guide

NITF for ArcGIS User's Guide
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(www.csie.ntu.edu.tw/~cjlin/libsvm), adapted by ITT Visual Information Solutions for remote sensing image supervised classification purposes.

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Chapter 1: Introduction

In this chapter you will find:

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About NITF for ArcGIS

The National Imagery Transmission Format (NITF) standard is a raster format defined by the NITF Standards Technical Board. The Joint Interoperability Test Command (JITC) certifies systems implementing the NITF format for compliance with the standard. NITF for ArcGIS® provides JITC-compliant support for the NITF file format and is required for compliant NITF support in ArcGIS. NITF for ArcGIS 1.3 was tested by the JITC and has been recommended for full compliance registration to complexity level 7 for NITF 2.1 and complexity level 6 for NITF 2.0 (the highest for each format).

Contact the JITC (<http://jitc.fhu.disa.mil/>) for detailed information about the NITF certification program, including functional read/write breakdown and testing anomalies.

NITF for ArcGIS provides the ability to read NITF data within the ArcGIS environment and create data products with ArcGIS Desktop that comply with the latest NITF specifications.

NITF File Support

NITF is a complex imagery and image exploitation information format capable of containing a wide variety of image and non-image information. Currently, there are three different versions of the NITF specification: NITF 1.1, NITF 2.0, and NITF 2.1. Each is similar to the others in many ways, but each also has its own characteristics.

NITF for ArcGIS provides the ability to read NITF 2.0, NITF 2.1, NSIF 1.0 and legacy NITF 1.1 files, and write NITF 2.0, NITF 2.1, and NSIF 1.0 datasets.

The NITF format is used extensively in the United States. The multinational members of the North Atlantic Treaty Organization (NATO) use the NATO Secondary Image Format (NSIF). The NSIF 1.0 format is identical to the NITF 2.1 format, with the exception of the version name in the file header. In place of `NITF02.10`, this field contains `NSIF01.00`.

General information about the NITF format, and specific information about the NITF 2.1 format, also applies to the NSIF format.

The NITF/NSIF Format

A valid NITF dataset provides a main header identifying the file as a NITF dataset and describing the contents of the file. The header is usually followed by one or more data segments. Each data segment consists of a segment subheader identifying the type and properties of the data, followed by the data itself. See "NITF Segments" on page 8 for more information on data segments.

Main Header

A NITF dataset may contain any or all types of segments available for that version, but every NITF dataset must contain a main header. The main header describes the entire file, including origination information, security information, file version and size, and the number and type of all data segments contained in the NITF dataset.

Data Segments

Data segments can be any of the following types:

- "Security Segments" on page 10
- "Image Segments" on page 11
- "Graphic/Symbol Segments" on page 12
- "Label Segments" on page 13
- "Annotation Segments" on page 13
- "Text Segments" on page 14
- "Data Extension Segments" on page 15

References

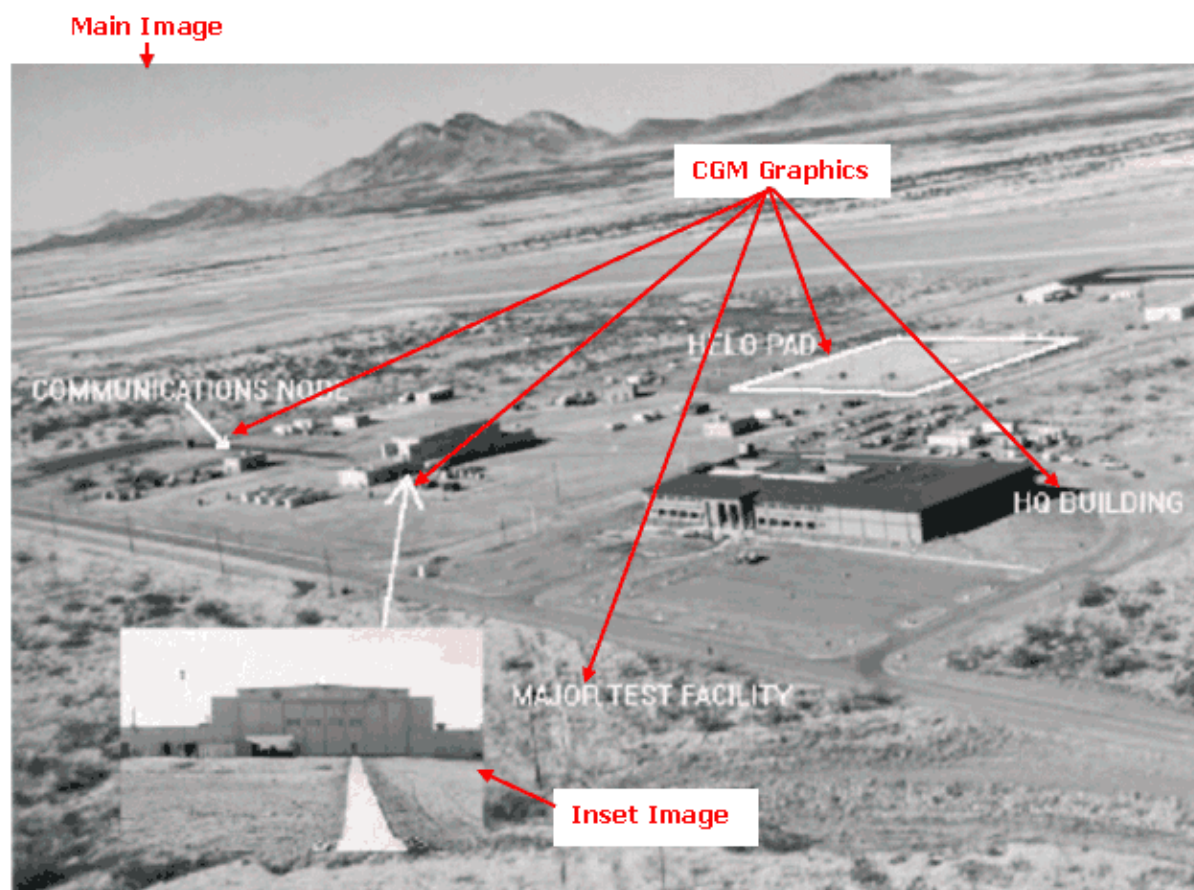
For more detailed information about the NITF/NSIF format and its components, see the technical specifications on the Reference Library for NITFS Users web site.

NITF Segments

While NITF datasets without graphical data are supported, most datasets contain one or more displayable segments. Displayable segments are image, graphic/symbol, or label segments that contain graphical information and text for display. These segments contain instructions about how the graphical data they contain should be displayed relative to any other displayable segments, resulting in a composite display encompassing all graphical information in the dataset.

Multiple Displayable Segments

The NITF format supports multiple image, graphical, and displayable text elements. A NITF dataset can contain all displayable segments (image, graphic/symbol, and label), making it possible for raw image information and additional exploitation material to co-exist nondestructively within the dataset. Each displayable segment contained in the NITF dataset contains information controlling the location of the display element in the composite. Each segment also contains a display level that determines which elements should be displayed on top of others, obscuring the lower-level displayable elements from view without corrupting the hidden portion of those lower-level displayable elements. For more information, see "Display Levels" on page 23. Below is an example of a NITF 2.1 dataset with multiple displayable segments.



In the previous image, a close-up image is positioned on top of the main image, obscuring part of the image. However, because the inset image is contained in an image segment separate from the main image, it can be moved, hidden, or deleted without destroying information contained in the main image underneath it. Likewise, the CGM graphics (text and graphical annotations) can be hidden or displayed without affecting the underlying image.

NITF Segment Types

NITF segments can be any of the following types:

- Security Segments
- Image Segments
- Graphic/Symbol Segments
- Label Segments
- Annotation Segments
- Text Segments
- Data Extension Segments

Security Segments

The NITF format was designed to contain information deemed sensitive, so it includes header data describing the status of any information that is not available to the general public. The main file header contains security information describing the security level of the entire NITF dataset, and each segment also contains security information in its subheader, as the confidentiality of data within a file may vary. The security level of the entire file (T = Top Secret, S = Secret, C = Confidential, R = Restricted, U = Unclassified) is the same as or higher than that of the most restricted segment in the file. NITF 2.0 uses the same fields as NITF 1.1 to contain security information, while NITF 2.1 deprecated some security information fields and added new fields.

These changes are described in the following table. For a detailed description of these security fields, consult the NITF specifications to determine which metadata are relevant to the version of your NITF file.

NITF 1.1/2.0 Security Fields	NITF 2.1 Security Fields
Classification	Classification
	Classification System
Codewords	Codewords
Control and Handling	Control and Handling
Releasing Instructions	Releasing Instructions
	Declassification Type
	Declassification Date
	Declassification Exemption
	Downgrade
	Downgrade Date
	Classification Text
	Classification Authority Type
Classification Authority	Classification Authority
	Classification Reason
	Security Source Date
Control Number	Security Control Number
Downgrade	
Downgrading Event	

When converting between NITF formats, the security fields will be mapped in accordance to Appendix G of the *Implementation Practices Of The National Imagery Transmission Format Standard (IPON)*, Coordination Draft Version 0.3A, 14 Jan 2005.

Image Segments

Image segments contain raster data, typically image data, intended for display or analysis. Image segments in a NITF file contain displayable image information. Each image segment contains a single image consisting of one or more bands of data (NITF 2.0 allows one, three, or four bands of data in an image, and NITF 2.1 allows up to 999 bands). All bands within an image segment must have the same data type, dimensions, storage order, and map information, although these characteristics can vary across different image segments.

Each image segment may contain specific display instructions, including color lookup tables for single-band images and default display bands for multi-band images. Images can be stored in integer data types in NITF 2.0 and in integer and real data types in NITF 2.1. Images can also be compressed using a variety of algorithms including JPEG DCT, Vector Quantization, Bi-level, JPEG 2000 NPJE (NITF 2.1 only), and JPEG 2000 EPJE (NITF 2.1 only). Images can be broken into blocks, providing an orderly set of subimages (or subarrays). Additional information describing the collection, intended use, wavelengths, and comments can also be stored with the image.

Image Masks

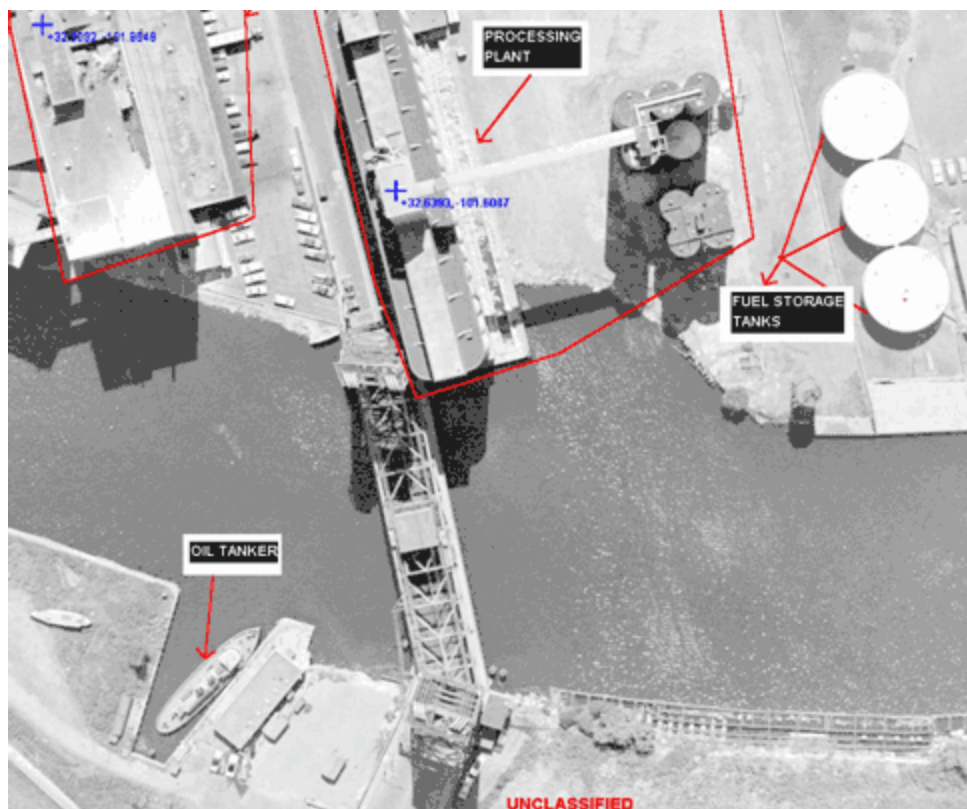
Mask information stored in image segments identifies pixels that are invalid or not intended to be displayed, and should therefore not be displayed.

Images that are rotated or have gaps can also contain a mask indicating which portions of the image should not be used for display or analysis. Two types of image masks are used in NITF files:

- **Blocked image masks** are used to mask entire blocks of image data.
- **Transparent pixel masks** are used for masking individual pixels or groups of pixels within an image block.

When an image segment containing masked blocks or pixels is displayed, pixels from images or graphics underneath the image segment show through and are displayed even though they would ordinarily be obscured. If a transparent pixel occurs with nothing displayed under it, or if for any other reason there is no display information for a pixel, the background color specified in the main file header is displayed.

In the image below, the textual, symbol, and graphical annotations are CGM graphics.



Graphic/Symbol Segments

Symbol segments can contain Computer Graphics Metafile (CGM), bitmap, or object elements, while label segments contain graphical text elements. The CGM format allows direct control of all display elements contained in the graphic including color, size, and orientation of objects. CGM graphics can contain complex lines and polygons, as well as displayable text. Multiple annotations can be combined in a single CGM, so symbol segments with CGM graphics may actually contain multiple sets of graphical primitives.

NITF 2.1 files can contain graphic segments with CGM graphic and graphical text elements, while NITF 2.0 files contain two segment types for the same purpose: symbol segments and label segments. Both the NITF 2.0 symbol segment and the NITF 2.1 graphic segment can contain CGM graphics. NITF for ArcGIS supports the display of NITF 2.1 graphic segments but does not support the display of NITF 2.0 symbol segments that contain bitmaps or graphic objects. NITF 2.0 files that contain this type of symbol segment will not be opened in ArcGIS software.

The NITF 2.1 graphic segment can only contain CGM graphics, but NITF 2.0 symbol segments can contain other graphical display elements as well. Symbol segments can contain bitmaps (color-mapped bitmaps to be displayed on the composite) or objects (graphics from a limited set of graphical primitives, including lines, arrows, circles, and rectangles).

For NITF 2.1, the bitmap and object symbol types as well as the label segment have been deprecated. Bitmaps are stored in image segments instead of symbols, and object symbols and labels have been removed in favor of the more general and powerful CGM.

Label Segments

Label segments, available only in NITF 2.0, contain displayable text intended to be drawn with the NITF display. In addition to this text, a label segment includes display instructions such as font, color, size, and a background color to display behind the text.

There are many required CGM elements to draw the data contained in a NITF 2.0 label segment. Element details are described in MIL-STD-2301A.

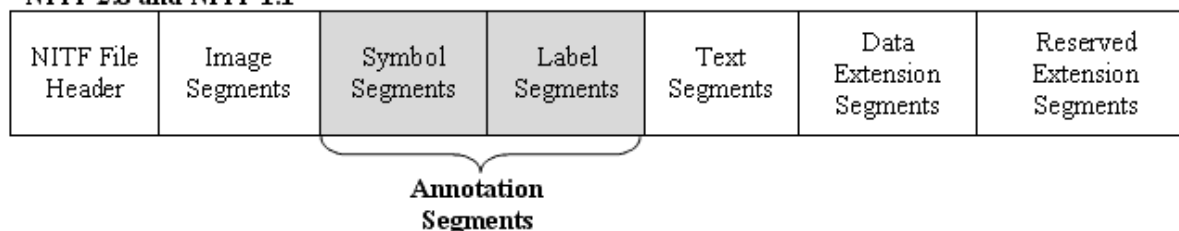
Note: NITF for ArcGIS converts NITF 2.0 label segments to Computer Graphics Metafile (CGM) data for display. Conversion will closely match the input label segment metadata.

Annotation Segments

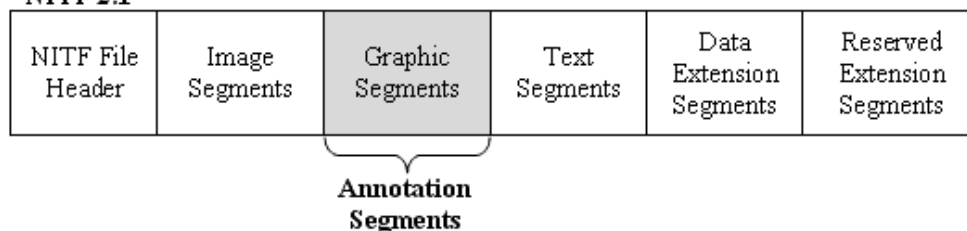
NITF 2.0 symbol and label segments, as well as NITF 2.1/NSIF 1.0 graphics segments, are collectively referred to as annotation segments in the software, as illustrated in the following diagram.

Image, text, and extension segments are available in every version of NITF, while label and symbol segments can occur only in NITF 2.0 datasets. Graphic segments occur only in NITF 2.1 datasets.

NITF 2.0 and NITF 1.1



NITF 2.1



Because of the similarity between the symbol segments and label segments in NITF 2.0 files, and the graphic segments in NITF 2.1 files, the software combines these segments into a single conceptual type (annotation segments). Annotation segments can contain symbol, label, or graphic segments, and they might include text, ellipses, polylines, bitmaps, and other objects. Annotation segments do not exist in any NITF file, and they are not mentioned in the NITF specification documents. They are a simplification used to reduce the overall number of segment types.

Annotation segments and image segments both carry information intended to be displayed graphically, and both are referred to as displayable segments in the documentation.

Annotation Objects

Because CGM graphics are capable of displaying multiple graphical elements, each annotation segment must be capable of storing multiple displayable features. In the software, these displayable features are referred to as annotation objects. Each annotation segment contains one or more annotation objects. NITF 2.0 and 2.1 annotation segments can contain multiple CGM annotation objects; each NITF 2.0 annotation segment can only contain one non-CGM label, bitmap, or object symbol annotation object. The type of object determines which fields will be filled in the annotation object.

Text Segments

Text segments contained in a NITF dataset consist of textual information that is not intended for graphical display. This information may be textual notes explaining target information, or the text segment may be used for passing US Message Text Format (USMTF) and text notes to other users.

Data Extension Segments and Tagged Record Extensions

Two types of extension segments, data and reserved, provide storage within the file structure for additional information that cannot be contained in the file or segment header. Data extension segments are used as necessary for storing Tagged Record Extensions (TREs), and the reserved extension segment is reserved for future expansion of the NITF format.

Data Extension Segments

Data Extension Segments (DESeS) contain data that cannot be stored in the other NITF segments. An example is the NCDRD Attitude Data DES, CSATTA. A list of unclassified, registered DESeS is available at http://jitc.fhu.disa.mil/nitf/tag_reg/des.htm.

Supported DESeS

The software only supports NITF Commercial Dataset Requirements Document (NCDRD) DESeS. You cannot edit, create, or delete NCDRD DESeS through the Metadata Editor.

Name	Filename	Long Name
CSATTA	CSATTA_DES.xml	Attitude Data
CSSHPA	CSSHPA_DES.xml	Shapefile

If a NITF file contains valid supported Data Extension Segments (DESeS), the DESeS are automatically saved in the output file. When opening a NITF image, the DES user-defined subheader will not be read if the input data format does not mirror the format in the accompanying XML definition file. When writing a NITF file that contains a DES with no corresponding XML file, the software passes through this unknown DES in NITF 2.1 and NSIF 1.0 files only. The software does not support unknown DESeS in NITF 2.0 files. See "Preserving DESeS" on page 41.

Tagged Record Extensions

TREs may be present in NITF files to contain types of information that cannot be stored in the NITF file header or segment subheaders. One or more TREs that apply to the entire NITF dataset can be present in the file header, and each segment (image or text) can also have one or more TREs associated with it. In some cases, TREs are applied to the data in a file or segment to enhance the utility of the data. Unless there is a large amount of data in a TRE, the TRE data is stored in the main header or segment subheader to which the TRE applies. For TREs too large to fit in the segment TRE area, a Data Extension Segment (DES) is created at the end of the file, and a pointer to this DES is stored within the header.

TREs come in two forms: Registered Extensions (REs) and Controlled Extensions (CEs). The NITF Standard Technical Board (NTB) maintains a registry of known CEs and REs: the main difference between them is that both the TRE name and TRE layout of CEs are controlled by the NTB, whereas only the TRE names of REs are registered with the NTB to prevent different users from using the same TRE name. Therefore, CEs can be interpreted based on the published information contained in the NTB repository, whereas REs require specific knowledge of the TRE contents available to the creator of the TRE that may not be available to the data consumer.

An example of a TRE is the RPC00B (Rapid Positioning Capability) TRE that can be associated with an image segment in a NITF dataset. This TRE provides coefficients that can be used to orthorectify the associated image segment. Other Controlled Extension TREs specify processing history, information about specific targets in an image, collection information, and other types of metadata.

The JITC repository of Controlled Extension and Registered Extension TREs can be viewed online at http://jitc.fhu.disa.mil/nitf/tag_reg/tagroup.htm.

Supported TREs

There are two levels of TRE support in NITF for ArcGIS:

- **Unsupported TREs:** TREs for which no definition is available, or the definition does not match the physical layout of the TRE. Only the raw data of TREs of this type can be viewed.
- **Supported TREs:** TREs that match a valid TRE definition. The data in these TREs can be read and written. The data in these TREs can be viewed with the appropriate header information in the NITF Metadata Viewer (see "Viewing NITF Metadata" on page 31). These TREs may be parsed into their specific components, and the value associated with each field in the TRE is displayed in the NITF Metadata Viewer. To view the information contained in this type of TRE, open the TRE container. Each field in the TRE is displayed as a single entry.

The data in these TREs can be written into file, image, and text segments of new NITF files. When saving to NITF, you can view these TREs in the NITF Metadata Viewer (see "Editing NITF Metadata" on page 33). Although the supported TREs for writing data can be displayed in the editor, only PIA TREs can be added, edited, or removed from their associated file header, image, annotation, or text segment.

Each TRE supported by the software references an XML definition file. Definition files for a partial list of the NTB-registered CEs are installed with the software. Support for TREs can be added by creating TRE definitions for the desired TREs.

When opening a NITF image, the software does not parse the TRE fields if there is no corresponding XML definition file. When writing a NITF file that contains a TRE with no corresponding XML file, the software passes through this unknown TRE.

The following table describes TREs that the software currently supports for reading and writing data. The Reference column provides links to the following NITF specification documents:

- BPJ2K01: BIIF Profile for JPEG 2000
<http://www.gwg.nga.mil/ntb/baseline/docs/bpj2k01/index.html>
- DIGEST: The Digital Geographic Information Exchange Standard (DIGEST) Part 2, Annex D: IMAGE INTERCHANGE FORMAT (IIF) ENCAPSULATION SPECIFICATION
<http://www.gwg.nga.mil/ntb/baseline/docs/digest/index.html>

- ENGRDA: Engineering Data (ENGRD) Support Data Extension (SDE) Version 1.0
http://www.gwg.nga.mil/ntb/baseline/docs/stdi-0002_v3/App%20N.doc
- RSM: Replacement Sensor Model Tagged Record Extensions Specification for NITF 2.1
http://www.gwg.nga.mil/ntb/coordinationitems/RSM__NITF_TRE's_delivery_July_23_04.pdf
- STD10001: National Support Data Extensions (SDE) for NITF, Version 1.3
<http://www.gwg.nga.mil/ntb/baseline/docs/stdi0001/index.html>
- STD10002: The Compendium of Controlled Extensions for NITF version 2.1
<http://www.gwg.nga.mil/ntb/baseline/docs/stdi0002/index.html>
- STD10006: National Transmission Format (NITF) Version 2.1 Commercial Dataset Requirements Document (NCDRD)
<http://www.gwg.nga.mil/ntb/baseline/docs/stdi0006/index.html>

TRE Name	Filename	Descriptive Name	Reference
ACCHZB	ACCHZB.xml	Horizontal Accuracy Extension	DIGEST
ACCPOB	ACCPOB.xml	Positional Accuracy Extension	DIGEST
ACCVTB	ACCVTB.xml	Vertical Accuracy Extension	DIGEST
ACFTA	ACFTA.xml	Aircraft Information Version A	STD10002
ACFTB	ACFTB.xml	Aircraft Information Version B	STD10002
AIMIDA	AIMIDA.xml	Additional Image Identification Version A	STD10002
AIMIDB	AIMIDB.xml	Additional Image Identification Version B	STD10002
BANDSA	BANDSA.xml	Multispectral/ Hyperspectral Band Parameters	STD10002
BANDSB	BANDSB.xml	Extended Multispectral/Hyperspectral Band Parameters	STD10002
BCKGDA	BCKGDA.xml	Background Data	STD10002
BLOCKA	BLOCKA.xml	Image Block Information	STD10002
BNDPLB	BNDPLB.xml	Bounding Polygon	DIGEST
CMETAA	CMETAA.xml	Complex Metadata Tagged Record Extension Version A	STD10002
CSCRNA	CSCRNA.xml	Corner Footprint	STD10006
CSDIDA	CSDIDA.xml	Dataset Identification	STD10006
CSCCGA	CSCCGA.xml	Cloud Cover Grid	STD10006
CSEPHA	CSEPHA.xml	Ephemeris Data	STD10006
CSEXRA	CSEXRA.xml	Exploitation Reference Data	STD10006
CSPROA	CSPROA.xml	Processing Information	STD10006
CSSFAA	CSSFAA.xml	Sensor Field Alignment Data	STD10006
ENGRDA	ENGRDA.xml	Engineering Data. To view this TRE, rename ENGRDA.xml_hold to ENGRDA.xml in the bin folder of your software distribution.	ENGRDA
EXOPTA	EXOPTA.xml	Exploitation Usability Optical Information	STD10002
EXPLTA	EXPLTA.xml	Exploitation Related Information Version A	STD10002
EXPLTB	EXPLTB.xml	Exploitation Related Information Version B	STD10002
GEOLOB	GEOLOB.xml	Local Geographic (lat/long) Coordinate System Extension	DIGEST

TRE Name	Filename	Descriptive Name	Reference
GEOPSB	GEOPSB.xml	Geographical Positioning for geo-referencing parameters including datum, ellipsoids	DIGEST
GRDPSB	GRDPSB.xml	Grid Positioning Version B	DIGEST
HISTOA	HISTOA.xml	Softcopy History Tagged Record Extension	STDI0002
ICHIPA	ICHIPA.xml	Image Chip Support Data Extension Version A	DIGEST
ICHIPB	ICHIPB.xml	Image Chip Support Data Extension Version B	STDI0002
IMASDA	IMASDA.xml	Segment Image Support Data	
IMRFCA	IMRFCA.xml	Segment Image Rational Function Coefficients	
IOMAPA	IOMAPA.xml	Input/Output Mapping Tagged Record Extension	STDI0002
J2KLRA	J2KLRA.xml	JPEG 2000 Parameters	BPJ2K01
MAPLOB	MAPLOB.xml	Local Cartographic (x/y) Coordinate System Extension	STDI0002
MENSRA	MENSRA.xml	Airborne SAR Mensuration Data Version A	STDI0002
MENSRB	MENSRB.xml	Airborne SAR Mensuration Data Version B	STDI0002
MPDSRA	MPDSRA.xml	Mensuration Data	STDI0002
MSTGTA	MSTGTA.xml	Mission Target	STDI0002
MTIRPA	MTIRPA.xml	Moving Target Information Report Version A	STDI0002
MTIRPB	MTIRPB.xml	Moving Target Information Report Version B	STDI0002
NBLOCA	NBLOCA.xml	(Number of Bytes) Image Block or Frame is Offset.	STDI0002
OFFSET	OFFSET.xml	(NITF 2.1) Offset of the first pixel of an image from the first pixel of the full image.	STDI0002
PATCHA	PATCHA.xml	Patch Information Version A	STDI0002
PATCHB	PATCHB.xml	Patch Information Version B	STDI0002
PIAEQA	PIAEQA.xml	Profile for Imagery Archives Equipment	STDI0002
** *		Profile for Imagery Access Equipment	
PIAEVA	PIAEVA.xml	Profile for Imagery Archives Event	STDI0002
** *		Profile for Imagery Access Event	
PIAIMB	PIAIMB.xml	Profile for Imagery Archives Image	STDI0002
**			
PIAIMC *	PIAIMC.xml	Profile for Imagery Access Image	STDI0002
PIAPEA	PIAPEA.xml	Profile for Imagery Archives Person	STDI0002
**			
PIAPEB *	PIAPEB.xml	Profile for Imagery Access Person	STDI0002
PIAPRC	PIAPRC.xml	Profile for Imagery Archives Product	STDI0002
**			
PIAPRD *	PIAPRD.xml	Profile for Imagery Access Product	STDI0002
PIATGA	PIATGA.xml	Profile for Imagery Archives Target	STDI0002
**			
PIATGB	PIATGB.xml	Profile for Imagery Access Target	STDI0002
*			
PRJPSB	PRJPSB.xml	Projection Parameters Extension	DIGEST
REGPTB	REGPTB.xml	Registration Points Extension	DIGEST
RPC00A	RPC00A.xml	Rapid Positioning Capability Support Data Extension	STDI0001
RPC00B	RPC00B.xml	Rapid Positioning Capability Support Data Extension	STDI0002

TRE Name	Filename	Descriptive Name	Reference
RSMIDA	RSMIDA.xml	RSM Identification	RSM
RSMPIA	RSMPIA.xml	RSM Polynomial Identification	RSM
RSMPCA	RSMPCA.xml	RSM Polynomial Coefficients	RSM
RSMDCA	RSMDCA.xml	RSM Direct Error Covariance	RSM
RSMAPA	RSMAPA.xml	RSM Adjustable Parameters	RSM
RSMECA	RSMECA.xml	RSM Error Covariance	RSM
RSMGIA	RSMGIA.xml	RSM Ground-to-image Grid identification	RSM
RSMGGA	RSMGGA.xml	RSM Ground-to-image Grid	RSM
SECTGA	SECTGA.xml	Secondary Target Information	STDI0002
SENSRA	SENSRA.xml	EO-IR Sensor Parameters	STDI0002
STDIDC	STDIDC.xml	Standard ID Extension	STDI0002
STREOB	STREOB.xml	Stereo Information	STDI0002
USE00A	USE00A.xml	Exploitation Usability Extension	STDI0002

* Indicates TREs that can be created, edited and deleted.

** Indicates TREs that can only be edited and deleted. These TREs cannot be added.

NITF Options

From the ArcMap menu bar, select **Customize > NITF Options**.

Option	Description
NITF File Cache Size	The cache size for the NITF image. The default is 256 MB .
Automatically View Metadata	Enable or disable automatically displaying the NITF Metadata Viewer dialog when you open a NITF file. The default is False .
Suppress Input Warning Messages	Enable or disable showing NITF input warning messages when opening a NITF file. The default is True .
Originating Station ID	The station ID of the organization in which the image originated. If you enter your own value, that value will be used in the output file. If this preference field is initially empty, the software populates it with <code>ARCNITF</code> . Set this preference field to <code>NO CHANGE</code> (all uppercase) if you want the software to pass through the input value with no change.
Originator's Name	The name of the image's originator. If this preference field is initially empty, it remains empty in the output file. If you enter your own value, that value will be used in the output file. Set this preference field to <code>NO CHANGE</code> (all uppercase) if you want the software to pass through the input value with no change.
Originator's Phone Number	The telephone number of the image's originator. If this preference field is initially empty, it remains empty in the output file. If you enter your own value, that value will be used in the output file. Set this preference field to <code>NO CHANGE</code> (all uppercase) if you want the software to pass through the input value with no change.
File Title Chip Prefix	The prefix to add to the File Title metadata if you save a spatial subset. The default is <code>Chip_hhmmss_of_</code> , where the hour (hh), minute (mm), and second (ss) reflect the time that you create the subset. If you remove this default value and enter your own text, the software appends your text to the filename.
HISTOA Processing Site	The name of the company who performed the processing event. Enter up to 10 characters of text. This preference fills in the PSITE field of the HISTOA Processing Site.

New NITF File Metadata Preferences

This section of NITF preferences contains NITF file metadata defaults. Descriptions of the NITF file metadata fields are in MIL-STD-2500B or MIL-STD-2500A. These preferences only pertain to **NITF Export Map**, or when you save a non-NITF file to NITF format (using **Save As**).

New PIA TRE Metadata Preferences

This section of NITF preferences contains PIA TRE file metadata defaults. Descriptions of the PIA TRE metadata fields are in STDI-0002. These preferences only pertain to creating new PIA TREs, as described in "Editing NITF Metadata" on page 33.

Chapter 2: Working with NITF for ArcGIS

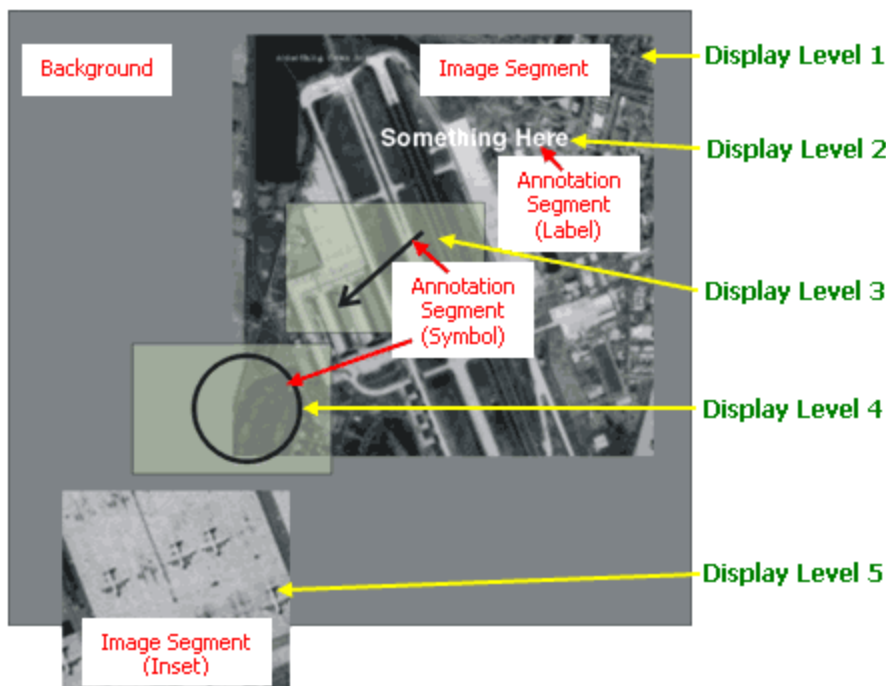
In this chapter you will find:

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NITF Map Information.....	25
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Display Levels

Each displayable segment in a NITF dataset is assigned a display level that determines the order of display. Segments with higher display levels are displayed over those with lower display levels.

The following image shows these levels and their corresponding displayable segments.



This image illustrates the content of a composite NITF file. In this example, three annotation segments are displayed on top of a base image segment, another image segment is displayed as an inset, and the composite of these elements is displayed on a gray background.

The image below shows the composite of the three annotation segments, the two image segments, and the gray background. While the annotations obscure portions of the underlying image in the composite image, each annotation exists as a separate segment that can be displayed or hidden without affecting the underlying image.



Wavelength Information

Wavelength information can be stored in several different ways in a NITF image segment. The BANDSB TRE contains the most information, followed by the BANDSA TRE, and the band subcategory settings contain the least information. The software will attempt to read wavelength information from a NITF file from each of those locations, in order, until wavelength information is found. If no information is present in any of these locations, the file is opened without wavelength information.

NITF Map Information

Map information in a NITF file can come from multiple sources, which are found in rapid positioning capability (RPC) TREs, DIGEST GeoSDE TREs, or in the IGEOLO image header field. See "Order and Precedence for Reading NITF Map Information" on page 26 for the order in which the software reads this map information for NITF files. The following sections describe these types of map information.

RPC00A and RPC00B

If the RPC00A or RPC00B TRE exists, the RPC model is used to emulate a projection by default.

If the Image Chip Support Data Extension Version B TRE (ICHIPB) is also present, information from this TRE is used to specify the offsets for the resulting map information. These offsets are needed to ensure the map information is consistent with the original positioning data.

DIGEST GeoSDE TREs

The software uses Digital Geographic Information Exchange Standard (DIGEST) GeoSDE TREs to improve georeferencing accuracy in NITF images. The software can use the Geo Positioning Information Extension (GEOPSB) and Projection Parameters Extension (PRJPSB) TREs stored in the file header, and the Local Geographic (lat/long) Coordinate System Extension (GEOLOB) and Local Cartographic Coordinate System (MAPLOB) TREs stored in the image segment subheader. Only these GeoSDEs are supported.

A complete, valid GeoSDE TRE set requires a GEOPSB TRE in the file header. This TRE defines the basic coordinate system information including ellipsoid, datum, units, and whether the coordinate system is geographic or cartographic (projected). If the GEOPSB TRE specifies a cartographic coordinate system, it must also be accompanied in the file header by the PRJSPB TRE, which specifies the associated projection and defines the projection parameters, if required.

In addition, only one of the following TREs must be present in the image segment to which the map information applies: GEOLOB, MAPLOB, GRDPSB, or REGPTB. Because GRDPSB and REGPTB TREs are not supported, image segments containing these TREs must obtain map information from another source. The GEOLOB TRE is provided if the GEOPSB TRE specifies a geographic projection, and the MAPLOB TRE specifies a cartographic projection. Both TREs store the coordinate location of the upper-left corner of the image and the (x, y) pixel size.

NITF images containing projection codes are not supported. The software cannot use the MAPLOB TRE to find map information. Unrecognized datum codes default to WGS-84.

When packing NITF files, you cannot create, edit, or delete the DIGEST GeoSDE TREs. If the NITF file contains valid GEOLOB or GEOPSB TREs, they are preserved if you save the file to a NITF-formatted file. If you are exporting the scene, the ICHIPB TRE is added.

ICORDS and IGEOLO

The software uses the image coordinate representation (ICORDS) and image geolocation (IGEOLO) header field in the image subheader to calculate map information for an image.

These image subheader fields contain values relative to how map information is displayed:

- **ICORDS:** A character representing the coordinate system of the image. The character can specify either UTM or Geographic coordinates, or may specify that no corner coordinates are present.
- **IGEOLO:** The coordinates for each of the four corner points. If the corner points are rectified, the upper-left corner position and the pixel size are calculated and standard map information is generated for the image. Otherwise, the four corner points are used to calculate a polynomial warp used to individually calculate the coordinate location for each pixel.

Order and Precedence for Reading NITF Map Information

If a NITF file contains multiple sources of map information, the order and precedence for reading the coordinate system is as follows.

1. **RPC information:** the software attempts to use RPC map information for the file.
2. **MAPLOB, PRJPSB, and GEOPSB TREs:** Map information (if available) will be imported from these TREs, and tie point and pixel sizes will be created in the specified projection. If the projection is not supported, this information is considered invalid and the next georeferencing method is attempted.
3. **GEOLOB and GEOPSB TREs:** If available, tie point and pixel size will be imported from these TREs in a geographic coordinate system.
4. **IGEOLO field in the NITF image subheader:** the software parses this subheader field; if it finds valid coordinates, it determines if they are rectified. If so, tie point and pixel size are computed for the image. Otherwise, an affine map transformation is used to determine georeferencing for the image.

Displaying NITF Images

NITF files appear in the ArcMap Table of Contents as a group layer. Each NITF segment appears in that group as a separate layer. For NITF files with multiple image segments, they appear as subfolders under the NITF file. For NITF files with multiple image segments, the name of each image segment begins with the highest level of security found in the file, followed by the word `Image`, followed by the number of the image segment (`Image #1` for example). The image segment name is then followed by the band names, which include the word `Band` and the index number (except in the case of a single-band image). An example is `Band_1`.

Displaying Images Using NITF for ArcGIS

Following are some rules for displaying images using NITF for ArcGIS:

- The software reads NITF 2.0 label segments, but it is unable to display 2.0 files that contain symbol segments that have bitmaps or graphic objects.
- The software does not display map information for files that contain multiple segments.
- The software does not display map information for files that contain one or more annotation (graphic) segments.
- The software reads and displays data in NITF 2.1 graphics segments, including CGM graphics.
- The software does not read or display vector shapefiles stored in the CSSHPA Data Extension Segment (DES).
- The software does not read NITF files that contain no image segments.
- The software does not currently support the M8 image compression format.
- The software reads and displays files that contain a segment marked "no display." If the **Suppress Input Warning Messages** NITF option is set to **False**, a message will display to notify you that a "no display" image is being opened.
- If a NITF file contains one or more image segments marked for display and one or more marked "no display," the "no display" image segments are ignored and therefore not shown in the ArcMap Table of Contents.
- If an image does not display correctly in ArcMap, it is recommended that you apply a stretch in ArcMap to improve the visual contrast (see the ArcMap help for more information).
- The segment with the highest display level is displayed at the top of the stack of layers in the ArcMap Table of Contents and the segment with the lowest display level is displayed at the bottom of that stack of layers.

Special Cases

The contents of the image representation (IREP) and band representation (IREPBAND) fields in the image subheader affect how NITF images display. The IREP values that occur most frequently are MONO (monochrome), RGB (three-band true color), RGB\LUT (single-band image with color palette), MULTI (multi-band imagery), and NODISPLAY (image not intended for display). The IREPBAND values used in this process are R (Red), G (Green), B (Blue), M (Mono), and LU (Look-Up Table). The image contains one IREP value for the image segment, and one IREPBAND value for each band in the dataset.

- Images with the IREP value RGB\LUT will be displayed in true color by default, and the image will be decomposed into red, green, and blue bands.
- Multiple-band images with three bands identified as R, G, and B are displayed as RGB composites, and the three bands will be represented as red, green, and blue bands.
- If no RGB values are found in the image, and there is a band marked LU, this band will be displayed with the lookup table applied.
- If the image contains a band with the value M, it is displayed as a grayscale image.
- If a NITF file contains a lookup table and mask, the software ignores the lookup table and uses the mask.

Chapter 3: Working with NITF Metadata

In this chapter you will find:

Viewing NITF Metadata	31
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Viewing NITF Metadata

The NITF Metadata Viewer allows you to view the metadata in the header and subheaders of a NITF file and optionally save the metadata to an ASCII file. You can also view the contents of TREs, DESes, annotation segments, and text segments in the file. To view the metadata of a NITF file, perform the following steps:

1. In the ArcMap Table of Contents or the ArcCatalog Catalog Tree, right-click on the NITF filename, point to **NITF**, and select **View NITF Metadata**. The NITF Metadata Viewer appears. The number and type of items shown vary according to the dataset being displayed. The metadata displayed in each item vary per different versions of NITF.
2. Click the + next to the file header, image segment, text segment, or DES to expand the information available. See "NITF Metadata Icons" on page 31 for information on identifying the types of metadata that may appear in a particular container. Metadata are grouped as follows:

NITF File Header Metadata

Security Metadata

TRE Metadata (if present)

Image Segment Metadata

Security Metadata

Band Metadata (one for each band)

Image Comments (if present)

TRE Metadata (if present)

Text Segment Metadata (if present)

Security Metadata

TRE Metadata (if present)

Data Extension Segments (DESes, if present)

Security Metadata

User-defined Subheader (if present)

Annotation Segment Metadata (if present)

Security Metadata

Annotation Object Metadata (if present)

TRE Metadata (if present)

Note: Header and segment fields are described in MIL-STD-2500C and MIL-STD-2500A.

3. To optionally save the metadata to an ASCII file, click **Save Metadata**. The Output Metadata Filename dialog appears. Enter an output filename (.txt) and click **Save**.
4. Click **Close** to dismiss the NITF Metadata Viewer.

NITF Metadata Icons

The following icons appear in the NITF Metadata Viewer to identify the types of metadata that may appear in a particular container:

Container	Icon	Description
File Header		Contains metadata common to the entire NITF file. In addition to file metadata, this container can contain tags or security metadata pertaining to the entire file.
Security		Contains security metadata for the file, image segment, text segment, annotation segment, or data extension segment.
TRE	 	A white icon contains metadata for a TRE that cannot be edited. A green icon contains editable metadata for the tag. A blue icon contains TREs from a TRE Overflow DES.
DES		Contains Data Extension Segments (DESeS). This container may contain security metadata and user-defined subheader fields.
Single-band Image Segment		Contains image metadata for a single-band image segment. In addition to information about the image band, this container may contain security metadata, image comments, and tag metadata containers.
Multi-band Image Segment		Contains image metadata for a multiple-band image segment. In addition to information about the image bands, this container may contain security metadata, image comments, and tag metadata containers.
Annotation Segment		Contains metadata for an annotation segment. In addition to one or more annotation object containers, this container may contain security tag metadata containers.
Text Segment		Contains metadata for a text segment.

Editing NITF Metadata

Header and segment fields are described in MIL-STD-2500C and MIL-STD-2500A.

1. Click the **Metadata Editor** button during **NITF Save As** or **NITF Export Map**.
2. Click the NITF file header, image segment, or text segment to view the corresponding metadata fields. Black text indicates that you can edit that field.
3. Optionally, create new PIA TREs; add, edit, or delete text segments; or delete annotation segments. Click **OK** to save your changes.

Creating New PIA TREs

Profile for Imagery Access TREs and Profile for Imagery Archive TREs (both of which you can create, edit, and delete) are discussed in detail in "Preserving PIA TREs" on page 43. You can also set default PIA TRE file metadata using **NITF Options**.

To create new PIA TREs, perform the following steps:

1. Click the **Metadata Editor** button during **NITF Save As** or **NITF Export Map**.
2. Right click on the NITF file header, image segment, annotation segment, or text segment to which to add the PIA TREs, and select **Add <PIA TRE>** or click the **Add PIAs** button.
3. Select which PIA TREs and how many of the TREs you want, then click **OK**.

Note: The PIAPRD TRE is the only PIA TRE that you can attach to a file header, and you can only add one PIAPRD TRE. You can only add one PIAIMC TRE to an image segment.

Adding, Editing, or Deleting NITF Text Segments

Adding Text Segments

1. Click the **Metadata Editor** button during **NITF Save As** or **NITF Export Map**.
2. Right click on the NITF file header, image segment, annotation segment, or text segment to which to add the text segment, and select **Add Text** or click the **Add Text** button.
3. Type your text in the field provided, and click **OK**. You can alternatively click the **Import ASCII** button to import a text file, and click **OK**. A new text segment appears in the tree view. The properties for that text segment automatically display.

Editing Text Segments

To edit existing text, click in the **Text** field, click the right arrow, and select **Edit**.

Deleting Text Segments

1. Click the **Metadata Editor** button during **NITF Save As** or **NITF Export Map**.
2. Right click on the text segment you wish to delete, and select **Delete Text** or click the **Delete Text** button.

Deleting NITF Annotation Segments

1. Click the **Metadata Editor** button during **NITF Save As** or **NITF Export Map**.
2. Right click on the annotation segment you wish to delete, and select **Delete Annotation** or click the **Delete Annotation** button.

Chapter 4: Saving Files

In this chapter you will find:

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Supported Data Types for NITF Export.....	45
NITF Compression Types.....	48

Saving NITF Files

There are a number of ways to save NITF files:

- Create a screen capture of all layers in the display using **NITF Export Map**.
- Create a new file from an existing NITF dataset using **NITF Save As**. You can also use this to create a subset of a NITF image or to edit NITF metadata.
- Create a new file from an existing raster dataset using **NITF Save As**.

The options listed above differ in the metadata that the software passes through or fills in by default. See "Saving Files to NITF" on page 39 and "NITF Export Map" on page 37 for more information on these differences.

The software attempts to determine a reasonable set of default values for all of the file parameters before a file is exported; however, you have the ability to edit these values before creating an output file. Many of the default values, such as the image size and data type, are determined by the data being exported. The NITF Metadata Editor shows the information that you can edit in a NITF file.

Main Header

You must check the set of parameters to be added to the NITF header fields to ensure internal consistency with the requirements set forth in the NITF specification before you can write a NITF dataset. This validation is performed automatically before any new NITF dataset is created. If the validation fails, an error message is generated that indicates the source of the failure, including the name of the field causing the error and a short description of the error. In most cases, you will have the opportunity to correct any errors before continuing.

NITF Export Map

This topic describes using the **NITF Export Map** option to create a screen capture of all layers in the display. All segments, vectors, annotations, and display properties are burned into the image and the software creates 8-bit, three-band output at the resolution you specify. Single-band images are output to three bands. To save an existing dataset as a new NITF file, see "Saving Files to NITF" on page 39.

The software can create new NITF datasets in NITF 2.0, NITF 2.1 and NSIF 1.0 format from existing raster data. In addition, some of the information written to the file, such as origination information and security settings, will be the same for all files you create. For these settings, you can use **NITF Options** to populate these fields by default. It is highly recommended that you customize these settings prior to creating any new NITF datasets.

When you create a new file from an existing dataset using **NITF Export Map**, the software generates all new header settings. The file date and time are set to the current date and time.

The input raster dataset must have one of the following coordinate systems:

- Geographic: NAD27, NAD83, or WGS-84
- Geographic with rational polynomial coefficients (RPCs): NAD27, NAD83, or WGS-84

- Projected: UTM/NAD27, UTM/NAD83, or UTM/WGS-84

This only pertains to the Data View.

Using NITF Export Map

1. From the ArcMap menu bar, select **File > NITF Export Map**.
2. Accept the default resolution, or change the resolution by typing in the **Resolution** field or by clicking the up/down arrows next to this field. Pixel width and height are displayed. Click **OK**.
3. Accept the default directory location and file name, or click **Browse** to select a directory location and type a file name. By default, the file name will be `untitled.ntf`.
4. Select a compression type from the **Compression** drop-down list.
5. Using the **Metadata Editor** button, you can optionally edit the NITF metadata and add PIA tags and text segments before saving the file.
6. Click **OK**.
7. Use the **Add Data** toolbar button to add the new file to ArcMap and display the output image.

Image Segments

NITF image segments can be created from any supported data type except 64-bit integer and complex. Image segments are populated in this way:

- **Security information, date and time:** The security information for the image segment is read from the **NITF Options**, and the image date and time are set. For NITF 2.1 files, the date and time is set to UNKNOWN; for NITF 2.0 files, the date and time is set to Jan. 1, 1970 (because NITF 2.0 does not recognize UNKNOWN).
- **Rows, columns, bands, and data type:** The number of rows, columns, bands, and the data type of the output dataset is determined from the input dataset. If the number of rows and columns is less than 4096, the block size is set to the full image size. For larger images, the image is set to a block size of 1024x1024.
- **Compression:** By default, the image is uncompressed.
- **Map information:** If the image has map information in UTM, this information is written to the file using the MGRS representation supported in both NITF 2.0 and 2.1. Other map information will be converted into geographic coordinates for export.

The software may also create GEOPSB, PRJPSB, GEOLOB, or MAPLOB TREs if the input file contains map information.

Saving Files to NITF

This topic describes using the **NITF Save As** option to save an existing NITF or raster dataset to a new NITF file. To save a screen capture of all layers in the Image window, see "NITF Export Map" on page 37.

When you create a new NITF file from an existing dataset, the header settings from the source dataset are saved to the new file, except for the following values:

- The file date and time are set to the current date and time.
- The number of file copies is incremented (unless it is currently set to 0), and this copy number is set to the number of copies.
- For existing NITF files, any image segment with a compression setting not supported for output is set to uncompressed by default.
- For existing NITF files, the output version will be the same as the input version. For all other file types, the version number is set using **NITF Options**.

Image segments cannot contain masks used to alter image values for display, when you create NITF output.

The input raster dataset must have one of the following coordinate systems:

- Geographic: NAD27, NAD83, or WGS-84
- Geographic with rational polynomial coefficients (RPCs): NAD27, NAD83, or WGS-84
- Projected: UTM/NAD27, UTM/NAD83, or UTM/WGS-84

This only pertains to the Data View.

Saving a Raster File to NITF

Use **NITF Save As** to create new NITF datasets in NITF 2.0, NITF 2.1 and NSIF 1.0 format from existing raster data. Some of the information written to the file, such as origination information and security settings, will be the same for all files you create. For these settings, use **NITF Options** to populate these fields by default. It is highly recommended that you customize these settings prior to creating any new NITF datasets.

Using NITF Save As

1. From the ArcMap Table of Contents or ArcCatalog Catalog Tree, right click on the NITF filename, point to **NITF**, and select **NITF Save As**.
2. Optionally, expand the file name (in a file with one or more image segments) and select an individual segment to save. If a NITF file contains one or more image segments marked for display and one or more marked "no display," the "no display" image segments are not shown in this dialog. However, when you save this file using the **Save As** option, the "no display" image segments are passed through with the NITF file.
3. Perform optional spatial subsetting, then click **OK**.

4. Accept the default directory location and file name, or click **Browse** to select a directory location and type a file name. By default, the file name will be `untitled.ntf`.
5. Select a compression type from the **Compression** drop-down list. This option will be unavailable for files with multiple image segments. In this case, the compression type is passed through from the existing file.
6. Using the **Metadata Editor** button, you can optionally edit the NITF metadata and add PIA tags and text segments before saving the file. See "Editing NITF Metadata" on page 33 and Creating New PIA TREs for more information.
7. Click **OK**.
8. You can add the new file to ArcMap using the **Add Data** toolbar button.

Image Segments

NITF image segments can be created from any supported data type except 64-bit integer and complex. Image segments are populated in this way:

- **Security information, date and time:** The security information for the image segment is read from the **NITF Options**, and the image date and time are set. For NITF 2.1 files, the date and time is set to UNKNOWN; for NITF 2.0 files, the date and time is set to Jan. 1, 1970 (because NITF 2.0 does not recognize UNKNOWN).
- **Rows, columns, bands, and data type:** The number of rows, columns, bands, and the data type of the output dataset is determined from the input dataset. If the number of rows and columns is less than 4096, the block size is set to the full image size. For larger images, the image is set to a block size of 1024x1024.
- **Compression:** By default, the image is uncompressed.
- **Map information:** If the image has map information in UTM, this information is written to the file using the MGRS representation supported in both NITF 2.0 and 2.1. Other map information will be converted into geographic coordinates for export.

The software supports creation of the RPC00B TRE when exporting to any NITF file containing RPC information. The RPC00B TRE is automatically created when this information is available, and the ICHIPB TRE is created if needed. These TREs will be stored in the image segment of the new NITF file. The ICHIPB TRE is required if a spatial subset of the input image is selected or the input image is a subset of a larger product.

The software may also create GEOPSB, PRJPSB, GEOLOB, or MAPLOB TREs if the input file contains map information.

- **Image and band representation:** For single-band images, the image representation field is set to MONO and the band representation is set to M, while three-band byte images have RGB as the image representation, with the band representations set to R, G, and B. For any other band count, the image representation will be set to MULTI and, if a set of default bands is specified for this file, these bands will have their representations set to R, G, and B to indicate that these bands should be displayed by default. See the table below for more information.

Type of Image	Image (Representation)	Band (Representation)
Single-band image	MONO	M
Three-band byte image	RGB	R,G,B

Type of Image	Image (Representation)	Band (Representation)
Other image	MULTI	R,G,B (if specified)

- **Wavelength information:** If wavelength information is not available for the file, or if only one band is being exported, the image category is set to VIS, and the band subcategory is left blank. If wavelength information is available, the software will attempt to convert the wavelength into nanometers, then write that information into the band subcategory. In this case, the image category is set based upon the number of input bands: HS is used for files with more than 200 bands, and MS is used for files with 2-200 bands. All other fields are left blank. The BANDSB TRE is automatically created and populated with all available information when the input file contains wavelength information.

Saving a NITF File to NITF

When saving an existing NITF file to NITF using the **NITF Save As** option, metadata that is contained in the original dataset will be passed through to the new NITF file.

NITF 2.1 images can be saved in NSIF Preferred JPEG 2000 Encoding (NPJE) format with numerically lossless and visually lossless compression settings. NITF 2.1 images can also be saved in Exploitation Preferred JPEG 2000 Encoding (EPJE) format with visually lossless and numerically lossless settings.

The software passes through or fills in by default some metadata. For more information, see the following topics:

- "Preserving DESes" on page 41
- "Preserving Annotation Segments" on page 41
- "Preserving Text Segments" on page 1
- "Preserving TREs" on page 42 "Preserving PIA TREs" on page 43
- "Preserving PIA TREs" on page 43

Preserving DESes

When you save an existing NITF file to NITF format, supported DES segments are preserved in the new file. The software currently only supports NITF Commercial Dataset Requirements Document (NCDRD) DESes. See "Data Extension Segments" on page 15 for a list of supported DESes. You cannot edit, create, or delete NCDRD DESes through the NITF Metadata Editor. When writing a NITF file that contains a DES with no corresponding XML file, the software passes through this unknown DES.

Preserving Annotation Segments

When you save an existing NITF file to NITF format, the software preserves CGM annotation segments. You cannot alter any data or metadata associated with the annotation segment, however you can edit the following fields in the NITF Metadata Editor: Annotation ID, Annotation Name, and Annotation Security Fields.

You cannot add annotation segments when creating a new NITF file from a non-NITF file. You can delete annotation segments from a NITF file when saving.

If you subset a NITF image file containing annotation segments, the following rules apply:

- If an annotation segment is attached to the file (level 0) and you subset the file, the annotation location does not change. The annotation will be in the same location in the input and output file but may not be in the same relative location to other objects in the file.
- If an image segment is entirely or partially inside the subset and has one or more annotation segments attached to it, the annotation segments are saved. In the output file, the annotation segments are in the same relative location to the image they are attached to as they are in the input file.
- If an image segment is outside the subset and has one or more annotation segments attached to it, the image and annotation segments are discarded. Any segments attached to the discarded annotation segment are also dropped.
- If you subset a file and the annotation segment location is to the left of the subset, the annotation segment is discarded because negative common coordinate system (CCS) location values are not allowed in NITF files.
- Annotation segment graphics are not subsetted; they pass through unchanged.

Preserving Text Segments

When you save a NITF file to a new NITF file, text segments and associated TREs are preserved (included) in the new file. In NITF 2.1, text segments are attached to either the file or an image segment of a NITF image file by using an attachment level field, `TX TALVL`. The attachment level is the display level of an image or graphic segment to which the text segment is attached; a value of 0 indicates the attachment is to the file header. Per the NITF Specification, NITF 2.0 text segments do not have attachment levels.

Preserving TREs

When you save a NITF file to a new NITF file, supported TREs associated with any exportable segments are preserved in the new file (see: "Tagged Record Extensions" on page 15). A warning message is provided if any TRE is not supported.

If you select a spatial subset of an input dataset for output, the `ICHIPB` TRE is used to maintain the relationship of the output image data to the source image data and to ensure the validity of any other TRE. The `ICHIPB` TRE contains the size and position of the subset and is written in the image segment. A new `ICHIPB` TRE is added to the list of TREs when you export an image segment with a TRE with any spatial subset other than the entire image. If the `ICHIPB` TRE already exists, it is modified for the new (smaller) subset of the initial subset to still contain the correct parameters from the original source image, not the initial subset.

If a NITF image segment contains HISTOA TREs and NEVENTS is not equal to the maximum value of 99 in the last HISTOA TRE, the software automatically updates this TRE upon output. If NEVENTS is equal to 99 in the last HISTOA TRE, the software creates a new HISTOA TRE. The software does not create a new HISTOA TRE if the input NITF image segment does not contain a HISTOA TRE.

Preserving PIA TREs

Profile for Imagery Access and Profile for Imagery Archive (PIA) TREs are used to hold information required by the Standards Profile for Imagery Access (SPIA). A variety of government agencies require these TREs in NITF image products. When you save a NITF file to a new NITF file, the PIA TREs associated with the file header and any image, symbol, label, or text segments are preserved in the new file.

There are 10 unique PIA TREs; newer PIA TREs are labeled Profile for Imagery Access, and older PIA TREs are labeled Profile for Imagery Archive.

You can edit, delete, and save both sets of PIA TREs in NITF files, but you can only create the Profile for Imagery Access TREs shown in the following table. You can create the TREs with user-defined default values using **NITF Options**, and you can save (pack) these to an output NITF file. The software updates PIAPRC and PIAPRD TREs with the current date and time when you create NITF output.

PIA TRE	Header Location	Description
PIAPRD	File	Profile for Imagery Access Product
PIAIMC	Image	Information about products derived from a source image
		Profile for Imagery Access Image
PIATGB	Image, Symbol, Label, or Text	Additional image information
		Profile for Imagery Access Target
PIAPEB	Image, Symbol, Label, or Text	Descriptive data about targets in a segment. One TRE per target
		Profile for Imagery Access Person
PIAEVA	Image, Symbol, Label, or Text	Descriptive data about people in a segment. One TRE per identified person
		Profile for Imagery Access Event
PIAEQA	Image, Symbol, Label, or Text	Descriptive data about events in a segment. One TRE per identified event
		Profile for Imagery Access Equipment
		Descriptive data about equipment in a segment. One TRE per identified piece of equipment

The table below lists Profile for Imagery Archive TREs from an output NITF file that you can edit or delete, but not create.

PIA TRE	Header Location	Description
PIAPRC	File	Profile for Imagery Archive Product Information about products derived from a source image
PIAIMB	Image	Profile for Imagery Archive Image Additional image information
PIATGA	Image, Symbol, Label, or Text	Profile for Imagery Archive Target Descriptive data about targets in a segment. One TRE per target
PIAPEA	Image, Symbol, Label, or Text	Profile for Imagery Archive Person Descriptive data about people in a segment. One TRE per identified person
PIAEVA	Image, Symbol, Label, or Text	Profile for Imagery Archive Event Descriptive data about events in a segment. One TRE per identified event
PIAEQA	Image, Symbol, Label, or Text	Profile for Imagery Archive Equipment Descriptive data about equipment in a segment. One TRE per identified piece of equipment

For detailed information on these TREs, see the NITFS Technical Board document STDI-0002.

Supported Data Types for NITF Export

Supported data types and other criteria for export are described in the following table.

Compression Type	NITF 2.0	NITF 2.1
None	# of Bands: 1, 3, or 4 Data Types: • 8-bit unsigned integer • 16-bit unsigned integer	# of Bands: 1-999 Data Types: • 8-bit unsigned integer • 16-bit unsigned integer • 16-bit signed integer • 32-bit unsigned integer • 32-bit signed integer • floating-point • double precision
JPEG DCT	# of Bands: 1 or 3 Data Types: Byte	# of Bands: 1 or 3 Data Types: Byte
JPEG 2000 NPJE	Not available	# of Bands: 1-999 Data Types: • 8-bit unsigned integer • 16-bit unsigned integer • 16-bit signed integer • 32-bit unsigned integer • 32-bit signed integer • 32-bit floating point • complex
JPEG 2000 EPJE	Not available	# of Bands: 1-999 Data Types: • 8-bit unsigned integer • 16-bit unsigned integer • 16-bit signed integer • 32-bit unsigned integer • 32-bit signed integer • 32-bit floating point • complex

You can edit all security and origination information contained in the file, along with image settings controlling how the image is written (including image blocking settings) using **NITF Options**. Many of these settings have no required values, some have only a short list of acceptable values, and others are dependent on the values present in other fields.

NPJE

You can save NITF 2.1 images in NPJE (NSIF Preferred JPEG 2000 Encoding) with numerically lossless and visually lossless settings.

If you choose JPEG 2000 NPJE compression, the software creates a J2KLRA TRE and removes the existing J2KLRA TRE, if present. If you save a file containing a J2KLRA TRE to an uncompressed file, the software removes the J2KLRA TRE.

EPJE

You can save NITF 2.1 images in Exploitation Preferred JPEG 2000 Encoding (EPJE) format with visually lossless and numerically lossless settings. When saving from a NITF file with an existing J2KLRA TRE, a new J2KLRA TRE is created because the image is being recompressed. NITF EPJE files display faster than NPJE files and EPJE is a required output format for IEC workstations.

The software cannot create an EPJE file without creating a temporary file. It uses the default temporary directory specified in **NITF Options**.

Transcoding

If you are saving a single C8 image segment without subsetting it, two additional options appear in the **Compression** drop-down list in the Save As dialog:

- Transcode NPJE to EPJE
- Transcode EPJE to NPJE

If you select one of these transcoding options, the image codestream is reordered to match the profile as closely as possible, and the codestream is neither decompressed nor recompressed.

The following changes may occur in the codestream, depending on the input profile of the codestream and the output option selected:

- Progression order (LRCP vs. RLCP)
- Segmentation and ordering of tile-parts
- PLT and TLM marker segments

The following do not change:

- Tile size
- Code-block size
- Quality
- Number of decomposition levels
- Wavelet transform
- Number of guard bits

If the image segment contains a J2KLRA or HISTOA TRE, these are updated with the appropriate information.

Note: Transcoding is not available for image segments that are embedded JPEG 2000 files.

NITF Compression Types

The types of compression available (if any) are determined by the data type and the NITF output version selected, as indicated in the table below. Higher compression rates result in smaller files with lower quality.

The following table shows the available compression types.

NITF Output Version	Data Type	Compression Types
All versions	1- or 3-Band Byte	JPEG DCT (High compression) JPEG DCT (Medium compression) JPEG DCT (Low compression)
NITF 2.1 and NSIF 1.0 (NPJE, EPJE)	Any Integer data type	JPEG 2000 NPJE (Visually Lossless) JPEG 2000 NPJE (Numerically Lossless) JPEG 2000 EPJE (Visually Lossless) JPEG 2000 EPJE (Numerically Lossless)
	Floating Point, Double	None

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